



SEQUENCE LISTING

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<120> METHOD FOR DETERMINING FUNCTIONAL SITES IN A PROTEIN

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<160> 29

<170> PatentIn version 3.3

<210> 1

<211> 327

<212> PRT

<213> Escherichia coli

<400> 1

Ala Tyr Ile Ala Lys Gln Arg Gln Ile Ser Phe Val Lys Ser His Phe
1 5 10 15

Ser Arg Gln Leu Glu Glu Arg Leu Gly Leu Ile Glu Val Gln Ala Pro
20 25 30

Ile Leu Ser Arg Val Gly Asp Gly Thr Gln Asp Asn Leu Ser Gly Ala
35 40 45

Glu Lys Ala Val Gln Val Lys Val Lys Ala Leu Pro Asp Ala Gln Phe
50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg Gln Thr Leu Gly Gln
65 70 75 80

His Asp Phe Ser Ala Gly Glu Gly Leu Tyr Thr His Met Lys Ala Leu
85 90 95

Arg Pro Asp Glu Asp Arg Leu Ser Pro Leu His Ser Val Tyr Val Asp
100 105 110

Gln Trp Asp Trp Glu Arg Val Met Gly Asp Gly Glu Arg Gln Phe Ser
115 120 125

Thr Leu Lys Ser Thr Val Glu Ala Ile Trp Ala Gly Ile Lys Ala Thr
 130 135 140

Glu Ala Ala Val Ser Glu Glu Phe Gly Leu Ala Pro Phe Leu Pro Asp
 145 150 155 160

Gln Ile His Phe Val His Ser Gln Glu Leu Leu Ser Arg Tyr Pro Asp
 165 170 175

Leu Asp Ala Lys Gly Arg Glu Arg Ala Ile Ala Lys Asp Leu Gly Ala
 180 185 190

Val Phe Leu Val Gly Ile Gly Gly Lys Leu Ser Asp Gly His Arg His
 195 200 205

Asp Val Arg Ala Pro Asp Tyr Asp Asp Trp Ser Thr Pro Ser Glu Leu
 210 215 220

Gly His Ala Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Pro Val Leu
 225 230 235 240

Glu Asp Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Ala Asp
 245 250 255

Thr Leu Lys His Gln Leu Ala Leu Thr Gly Asp Glu Asp Arg Leu Glu
 260 265 270

Leu Glu Trp His Gln Ala Leu Leu Arg Gly Glu Met Pro Gln Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Thr Met Leu Leu Leu Gln Leu
 290 295 300

Pro His Ile Gly Gln Val Gln Ala Gly Val Trp Pro Ala Ala Val Arg
 305 310 315 320

Glu Ser Val Pro Ser Leu Leu
 325

<210> 2
 <211> 327
 <212> PRT

<213> Shigella flexneri

<400> 2

Ala Tyr Ile Ala Lys Gln Arg Gln Ile Ser Phe Val Lys Ser His Phe
 1 5 10 15

Ser Arg Gln Leu Glu Glu Arg Leu Gly Leu Ile Glu Val Gln Ala Pro
 20 25 30

Ile Leu Ser Arg Val Gly Asp Gly Thr Gln Asp Asn Leu Ser Gly Cys
 35 40 45

Glu Lys Ala Val Gln Val Lys Val Lys Ala Leu Pro Asp Ala Gln Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg Gln Thr Leu Gly Gln
 65 70 75 80

His Asp Phe Ser Ala Gly Glu Gly Leu Tyr Thr His Met Lys Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Arg Leu Ser Pro Leu His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Arg Val Met Gly Asp Gly Glu Arg Gln Leu Ser
 115 120 125

Thr Leu Lys Ser Thr Val Glu Ala Ile Trp Ala Gly Ile Lys Ala Thr
 130 135 140

Glu Ala Ala Val Asn Glu Glu Phe Gly Leu Ala Pro Phe Leu Pro Asp
 145 150 155 160

Gln Ile His Phe Val His Ser Gln Glu Leu Leu Ser Arg Tyr Pro Asp
 165 170 175

Leu Asp Ala Lys Gly Arg Glu Arg Ala Ile Ala Lys Asp Leu Gly Ala
 180 185 190

Val Phe Leu Val Gly Ile Gly Gly Lys Leu Ser Asp Gly His Arg His
 195 200 205

Asp Val Arg Ala Pro Asp Tyr Asp Asp Trp Ser Thr Pro Ser Glu Leu

210

215

220

Gly His Ala Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Pro Val Leu
 225 230 235 240

Glu Asp Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Ala Asp
 245 250 255

Thr Leu Lys His Gln Leu Ala Leu Thr Gly Asp Glu Asp Arg Leu Gln
 260 265 270

Leu Glu Trp His Gln Ala Leu Leu Arg Gly Glu Met Pro Gln Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Thr Met Leu Leu Leu Gln Leu
 290 295 300

Pro His Ile Gly Gln Val Gln Cys Gly Val Trp Pro Ala Ala Val Arg
 305 310 315 320

Glu Ser Val Pro Ser Leu Leu
 325

<210> 3

<211> 327

<212> PRT

<213> Salmonella enterica

<400> 3

Ala Tyr Ile Ala Lys Gln Arg Gln Ile Ser Phe Val Lys Ser His Phe
 1 5 10 15

Ser Arg Gln Leu Glu Glu Arg Leu Gly Leu Ile Glu Val Gln Ala Pro
 20 25 30

Ile Leu Ser Arg Val Gly Asp Gly Thr Gln Asp Asn Leu Ser Gly Cys
 35 40 45

Glu Lys Ala Val Gln Val Lys Val Lys Ala Leu Pro Asp Ala Gln Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg Gln Thr Leu Gly Gln
 65 70 75 80

His Asp Phe Ser Ala Gly Glu Gly Leu Tyr Thr His Met Lys Ala Leu
85 90 95

Arg Pro Asp Glu Asp Arg Leu Ser Pro Leu His Ser Val Tyr Val Asp
100 105 110

Gln Trp Asp Trp Glu Arg Val Met Gly Asp Gly Glu Arg Gln Phe Ser
115 120 125

Thr Leu Lys Ser Thr Val Glu Ala Ile Trp Ala Gly Ile Lys Ala Thr
130 135 140

Glu Ala Glu Val His Lys Gln Phe Gly Leu Ala Pro Phe Leu Pro Asp
145 150 155 160

Gln Ile His Phe Val His Ser Gln Glu Leu Leu Ala Arg Phe Pro Asp
165 170 175

Leu Asp Ala Lys Gly Arg Glu Arg Ala Ile Ala Lys Glu Leu Gly Ala
180 185 190

Val Phe Leu Val Gly Ile Gly Gly Lys Leu Ser Asp Gly Arg Arg His
195 200 205

Asp Val Arg Ala Pro Asp Tyr Asp Asp Trp Ser Ser Ala Ser Glu Leu
210 215 220

Gly Tyr Ala Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Pro Val Leu
225 230 235 240

Glu Asp Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Ala Asp
245 250 255

Thr Leu Met Arg Gln Leu Ala Leu Thr Gly Asp Glu Asp Arg Leu Gln
260 265 270

Leu Glu Trp His Gln Ala Leu Leu Arg Gly Glu Met Pro Gln Thr Ile
275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Thr Met Leu Leu Leu Gln Leu
290 295 300

Pro His Ile Gly Gln Val Gln Cys Gly Val Trp Pro Ala Gln Val Arg
 305 310 315 320

Glu Ser Ile Pro Ala Ile Leu
 325

<210> 4
 <211> 327
 <212> PRT
 <213> Salmonella typhimurium

<400> 4

Ala Tyr Ile Ala Lys Gln Arg Gln Ile Ser Phe Val Lys Ser His Phe
 1 5 10 15

Ser Arg Gln Leu Glu Glu Arg Leu Gly Leu Ile Glu Val Gln Ala Pro
 20 25 30

Ile Leu Ser Arg Val Gly Asp Gly Thr Gln Asp Asn Leu Ser Gly Cys
 35 40 45

Glu Lys Ala Val Gln Val Lys Val Lys Ala Leu Pro Asp Ala Gln Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg Gln Thr Leu Gly Gln
 65 70 75 80

His Asp Phe Ser Ala Gly Glu Gly Leu Tyr Thr His Met Lys Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Arg Leu Ser Pro Leu His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Arg Val Met Gly Asp Gly Glu Arg Gln Phe Ser
 115 120 125

Thr Leu Lys Ser Thr Val Glu Ala Ile Trp Ala Gly Ile Lys Ala Thr
 130 135 140

Glu Ala Glu Val His Lys Gln Phe Gly Leu Ala Pro Phe Leu Pro Glu
 145 150 155 160

Gln Ile Gln Phe Val His Ser Gln Glu Leu Leu Ala Arg Phe Pro Asp
 165 170 175

Leu Asp Ala Lys Gly Arg Glu Arg Ala Ile Ala Lys Glu Leu Gly Ala
 180 185 190

Val Phe Leu Val Gly Ile Gly Gly Lys Leu Ser Asp Gly His Arg His
 195 200 205

Asp Val Arg Ala Pro Asp Tyr Asp Asp Trp Ser Ser Ala Ser Glu Leu
 210 215 220

Gly Tyr Ala Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Pro Val Leu
 225 230 235 240

Glu Asp Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Ala Asp
 245 250 255

Thr Leu Met Arg Gln Leu Ala Leu Thr Gly Asp Glu Asp Arg Leu Gln
 260 265 270

Leu Glu Trp His Gln Ala Leu Leu Arg Gly Glu Met Pro Gln Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Thr Met Leu Leu Leu Gln Leu
 290 295 300

Pro His Ile Gly Gln Val Gln Cys Gly Val Trp Pro Ala Gln Val Arg
 305 310 315 320

Glu Ser Ile Pro Ala Ile Leu
 325

<210> 5
 <211> 327
 <212> PRT
 <213> Yersinia pestis

<400> 5

Gln Phe Ile Gln Lys Gln Gln Gln Ile Ser Phe Val Lys Ser Phe Phe
 1 5 10 15

Ser Arg Gln Leu Glu Gln Gln Leu Gly Leu Ile Glu Val Gln Ala Pro
 20 25 30

Ile Leu Ser Arg Val Gly Asp Gly Thr Gln Asp Asn Leu Ser Gly Ser
 35 40 45

Glu Lys Ala Val Gln Val Lys Val Lys Ser Leu Pro Asp Ser Thr Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg Lys Thr Leu Gly Arg
 65 70 75 80

Phe Asp Phe Gly Ala Asp Gln Gly Val Tyr Thr His Met Lys Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Arg Leu Ser Ala Ile His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Arg Val Met Gly Asp Gly Glu Arg Asn Leu Ala
 115 120 125

Tyr Leu Lys Ser Thr Val Asn Lys Ile Tyr Ala Ala Ile Lys Glu Thr
 130 135 140

Glu Ala Ala Ile Ser Ala Glu Phe Gly Val Lys Pro Phe Leu Pro Asp
 145 150 155 160

His Ile Gln Phe Ile His Ser Glu Ser Leu Arg Ala Arg Phe Pro Asp
 165 170 175

Leu Asp Ala Lys Gly Arg Glu Arg Ala Ile Ala Lys Glu Leu Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Lys Leu Ala Asp Gly Gln Ser His
 195 200 205

Asp Val Arg Ala Pro Asp Tyr Asp Asp Trp Thr Ser Pro Ser Ala Glu
 210 215 220

Gly Phe Ser Gly Leu Asn Gly Asp Ile Ile Val Trp Asn Pro Ile Leu
 225 230 235 240

Glu Asp Ala Phe Glu Ile Ser Ser Met Gly Ile Arg Val Asp Ala Glu
 245 250 255

Ala Leu Lys Arg Gln Leu Ala Leu Thr Gly Asp Glu Asp Arg Leu Glu

260

265

270

Leu Glu Trp His Gln Ser Leu Leu Arg Gly Glu Met Pro Gln Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Val Met Leu Leu Leu Gln Lys
 290 295 300

Gln His Ile Gly Gln Val Gln Cys Gly Val Trp Gly Pro Glu Ile Ser
 305 310 315 320

Glu Lys Val Asp Gly Leu Leu
 325

<210> 6
 <211> 327
 <212> PRT
 <213> Streptococcus agalactiae

<400> 6

Ser Phe Ile His Gln Gln Gln Glu Ile Ser Phe Val Lys Asn Thr Phe
 1 5 10 15

Thr Gln Tyr Leu Ile Asp Lys Leu Glu Ile Val Glu Val Gln Gly Pro
 20 25 30

Ile Leu Ser Gln Val Gly Asp Gly Met Gln Asp Asn Leu Ser Gly Ile
 35 40 45

Glu His Pro Val Ser Val Lys Val Leu Asn Ile Pro Glu Ala Glu Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
 65 70 75 80

Phe Gly Phe Asn Glu Gly Glu Gly Leu Phe Val His Met Lys Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Ser Leu Asp Pro Thr His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Lys Val Ile Pro Asp Gly Arg Arg Asn Leu Asp
 115 120 125

Tyr Leu Lys Glu Thr Val Glu Lys Ile Tyr Lys Ala Ile Arg Leu Thr
 130 135 140

Glu Leu Ala Val Glu Ala Arg Phe Asp Ile Glu Ser Ile Leu Pro Lys
 145 150 155 160

Arg Ile Thr Phe Ile His Thr Glu Glu Leu Val Glu Lys Tyr Pro Asp
 165 170 175

Leu Ser Pro Lys Glu Arg Glu Asn Ala Ile Ala Lys Glu Tyr Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Glu Leu Ala Asp Gly Lys Pro His
 195 200 205

Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr Thr Pro Ser Glu Asn
 210 215 220

Gly Phe Lys Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Glu Gln Leu
 225 230 235 240

Gly Thr Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Asp
 245 250 255

Ala Leu Lys Arg Gln Val Val Leu Thr Gly Asp Glu Asp Arg Leu Glu
 260 265 270

Phe Glu Trp His Lys Thr Leu Leu Arg Gly Phe Phe Pro Leu Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Ala Met Phe Leu Leu Arg Lys
 290 295 300

Lys His Ile Gly Glu Val Gln Ser Ser Val Trp Pro Lys Glu Val Arg
 305 310 315 320

Asp Thr Phe Glu Asn Ile Leu
 325

<210> 7
 <211> 327
 <212> PRT
 <213> Streptococcus agalactiae

<400> 7

Ser Phe Ile His Gln Gln Gln Glu Ile Ser Phe Val Lys Asn Thr Phe
 1 5 10 15
 Thr Gln Tyr Leu Ile Asp Lys Leu Glu Ile Val Glu Val Gln Gly Pro
 20 25 30
 Ile Leu Ser Gln Val Gly Asp Gly Met Gln Asp Asn Leu Ser Gly Ile
 35 40 45
 Glu His Pro Val Ser Val Lys Val Leu Asn Ile Pro Glu Ala Glu Phe
 50 55 60
 Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
 65 70 75 80
 Phe Gly Phe Asn Glu Gly Glu Gly Leu Phe Val His Met Lys Ala Leu
 85 90 95
 Arg Pro Asp Glu Asp Ser Leu Asp Pro Thr His Ser Val Tyr Val Asp
 100 105 110
 Gln Trp Asp Trp Glu Lys Val Ile Pro Asp Gly Arg Arg Asn Leu Asp
 115 120 125
 Tyr Leu Lys Glu Thr Val Glu Lys Ile Tyr Lys Ala Ile Arg Leu Thr
 130 135 140
 Glu Leu Ala Val Glu Ala Arg Phe Asp Ile Glu Ser Ile Leu Pro Lys
 145 150 155 160
 Arg Ile Thr Phe Ile His Thr Glu Glu Leu Val Glu Lys Tyr Pro Asp
 165 170 175
 Leu Ser Pro Lys Glu Arg Glu Asn Ala Ile Ala Lys Glu Tyr Gly Ala
 180 185 190
 Val Phe Leu Ile Gly Ile Gly Gly Glu Leu Ala Asp Gly Lys Pro His
 195 200 205
 Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr Thr Pro Ser Glu Asn
 210 215 220

Gly Phe Lys Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Glu Gln Leu
 225 230 235 240

Gly Thr Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Asp
 245 250 255

Ala Leu Lys Arg Gln Val Val Leu Thr Gly Asp Glu Gly Arg Leu Glu
 260 265 270

Phe Glu Trp His Lys Thr Leu Leu Arg Gly Phe Phe Pro Leu Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Ala Met Phe Leu Leu Arg Lys
 290 295 300

Lys His Ile Gly Glu Val Gln Ser Ser Val Trp Pro Lys Glu Val Arg
 305 310 315 320

Asp Thr Phe Glu Asn Ile Leu
 325

<210> 8
 <211> 327
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 8

Ser Phe Ile His Gln Gln Glu Glu Ile Ser Phe Val Lys Asn Thr Phe
 1 5 10 15

Thr Gln Tyr Leu Lys Asp Lys Leu Glu Val Val Glu Val Gln Gly Pro
 20 25 30

Ile Leu Ser Lys Val Gly Asp Gly Met Gln Asp Asn Leu Ser Gly Val
 35 40 45

Glu Asn Pro Val Ser Val Lys Val Leu Gln Ile Pro Asp Ala Thr Tyr
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
 65 70 75 80

Phe Gly Phe Gly Glu Gly Glu Gly Leu Phe Val His Met Lys Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Ser Leu Asp Ala Thr His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Lys Val Ile Pro Asn Gly Lys Arg Asn Ile Val
 115 120 125

Tyr Leu Lys Glu Thr Val Glu Lys Ile Tyr Lys Ala Ile Arg Leu Thr
 130 135 140

Glu Leu Ala Val Glu Ala Arg Tyr Asp Ile Glu Ser Ile Leu Pro Lys
 145 150 155 160

Gln Ile Thr Phe Ile His Thr Glu Glu Leu Val Glu Arg Tyr Pro Asp
 165 170 175

Leu Thr Pro Lys Glu Arg Glu Asn Ala Ile Cys Lys Glu Phe Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Glu Leu Pro Asp Gly Lys Pro His
 195 200 205

Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr Ser Glu Ser Glu Asn
 210 215 220

Gly Tyr Lys Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Glu Ser Leu
 225 230 235 240

Gly Gly Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Glu
 245 250 255

Thr Leu Arg Arg Gln Val Glu Ile Thr Gly Asp Glu Asp Arg Leu Glu
 260 265 270

Leu Glu Trp His Lys Ser Leu Leu Asn Gly Leu Phe Pro Leu Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Met Ala Met Phe Leu Leu Arg Lys
 290 295 300

Arg His Ile Gly Glu Val Gln Thr Ser Val Trp Pro Gln Glu Val Arg

305

310

315

320

Asp Thr Tyr Glu Asn Ile Leu
325

<210> 9

<211> 327

<212> PRT

<213> Streptococcus pneumoniae

<400> 9

Ser Phe Ile His Gln Gln Glu Glu Ile Ser Phe Val Lys Asn Thr Phe
1 5 10 15

Thr Gln Tyr Leu Lys Asp Lys Leu Glu Val Val Glu Val Gln Gly Pro
20 25 30

Ile Leu Ser Lys Val Gly Asp Gly Met Gln Asp Asn Leu Ser Gly Val
35 40 45

Glu Asn Pro Val Ser Val Lys Val Leu Gln Ile Pro Asp Ala Thr Tyr
50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
65 70 75 80

Phe Gly Phe Gly Glu Gly Glu Gly Leu Phe Val His Met Lys Ala Leu
85 90 95

Arg Pro Asp Glu Asp Ser Leu Asp Ala Thr His Ser Val Tyr Val Asp
100 105 110

Gln Trp Asp Trp Glu Lys Val Ile Pro Asn Gly Lys Arg Asn Ile Val
115 120 125

Tyr Leu Lys Glu Thr Val Glu Lys Ile Tyr Lys Ala Ile Arg Leu Thr
130 135 140

Glu Leu Ala Val Glu Ala Arg Tyr Asp Ile Glu Ser Ile Leu Pro Lys
145 150 155 160

Gln Ile Thr Phe Ile His Thr Glu Glu Leu Val Glu Arg Tyr Pro Asp
165 170 175

Leu Thr Ser Lys Glu Arg Glu Asn Ala Ile Cys Lys Glu Phe Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Glu Leu Pro Asp Gly Lys Pro His
 195 200 205

Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr Ser Glu Ser Glu Asn
 210 215 220

Gly Tyr Lys Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Glu Ser Leu
 225 230 235 240

Gly Gly Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Glu
 245 250 255

Thr Leu Arg Arg Gln Val Glu Ile Thr Gly Asp Glu Asp Arg Leu Glu
 260 265 270

Leu Glu Trp His Lys Ser Leu Leu Asn Gly Leu Phe Pro Leu Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Met Ala Met Phe Leu Leu Arg Lys
 290 295 300

Arg His Ile Gly Glu Val Gln Thr Ser Val Trp Pro Gln Glu Val Arg
 305 310 315 320

Asp Thr Tyr Glu Asn Ile Leu
 325

<210> 10
 <211> 327
 <212> PRT
 <213> Streptococcus pyogenes MGAS8232

<400> 10

Ser Phe Ile His Gln Gln Glu Glu Ile Ser Phe Val Lys Asn Thr Phe
 1 5 10 15

Thr Gln Tyr Leu Ile Ala Lys Leu Asp Val Val Glu Val Gln Gly Pro
 20 25 30

Ile Leu Ser Arg Val Gly Asp Gly Met Gln Asp Asn Leu Ser Gly Thr

35

40

45

Glu Asn Pro Val Ser Val Asn Val Leu Lys Ile Pro Asn Ala Thr Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
 65 70 75 80

Phe Gly Phe Asn Glu Gly Glu Gly Leu Val Val Asn Met Lys Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Ser Leu Asp Gln Thr His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Lys Val Ile Pro Asp Gly Lys Arg Asn Leu Ala
 115 120 125

Tyr Leu Lys Glu Thr Val Glu Thr Ile Tyr Lys Val Ile Arg Leu Thr
 130 135 140

Glu Leu Ala Val Glu Ala Arg Tyr Asp Ile Glu Ala Val Leu Pro Lys
 145 150 155 160

Lys Ile Thr Phe Ile His Thr Glu Glu Leu Val Ala Lys Tyr Pro Asp
 165 170 175

Leu Thr Pro Lys Glu Arg Glu Asn Ala Ile Thr Lys Glu Phe Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Val Leu Pro Asp Gly Lys Pro His
 195 200 205

Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr Thr Glu Thr Glu Asn
 210 215 220

Gly Tyr His Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Asp Gln Leu
 225 230 235 240

Gly Ser Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Glu
 245 250 255

Ala Leu Lys Arg Gln Val Glu Met Thr Gly Asp Gln Asp Arg Leu Ala
 260 265 270

Phe Asp Trp His Lys Ser Leu Leu Asn Gly Leu Phe Pro Leu Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Met Val Met Phe Leu Leu Arg Lys
 290 295 300

Lys His Ile Gly Glu Val Gln Thr Ser Val Trp Pro Gln Glu Val Arg
 305 310 315 320

Asp Ser Tyr Asp Asn Ile Leu
 325

<210> 11
 <211> 327
 <212> PRT
 <213> Streptococcus pyogenes M1 GAS

<400> 11

Ser Phe Ile His Gln Gln Glu Glu Ile Ser Phe Val Lys Asn Thr Phe
 1 5 10 15

Thr Gln Tyr Leu Ile Ala Lys Leu Asp Val Val Glu Val Gln Gly Pro
 20 25 30

Ile Leu Ser Arg Val Gly Asp Gly Met Gln Asp Asn Leu Ser Gly Thr
 35 40 45

Glu Asn Pro Val Ser Val Asn Val Leu Lys Ile Pro Asn Ala Thr Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
 65 70 75 80

Phe Gly Phe Asn Glu Gly Glu Gly Leu Val Val Asn Met Lys Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Ser Leu Asp Gln Thr His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Lys Val Ile Pro Asp Gly Lys Arg Asn Leu Ala
 115 120 125

Tyr Leu Lys Glu Thr Val Glu Thr Ile Tyr Lys Val Ile Arg Leu Thr
 130 135 140

Glu Leu Ala Val Glu Ala Arg Tyr Asp Ile Glu Ala Val Leu Pro Lys
 145 150 155 160

Lys Ile Thr Phe Ile His Thr Glu Glu Leu Val Ala Lys Tyr Pro Asp
 165 170 175

Leu Thr Pro Lys Glu Arg Glu Asn Ala Ile Thr Lys Glu Phe Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Val Leu Pro Asp Gly Lys Pro His
 195 200 205

Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr Thr Glu Thr Glu Asn
 210 215 220

Gly Tyr His Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Asp Gln Leu
 225 230 235 240

Gly Ser Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Glu
 245 250 255

Ala Leu Lys Arg Gln Val Glu Met Thr Gly Asp Gln Asp Arg Leu Gly
 260 265 270

Phe Asp Trp His Lys Ser Leu Leu Asn Gly Leu Phe Pro Leu Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Met Val Met Phe Leu Leu Arg Lys
 290 295 300

Gln His Ile Gly Glu Val Gln Thr Ser Val Trp Pro Gln Glu Val Arg
 305 310 315 320

Asp Ser Tyr Asp Asn Ile Leu
 325

<210> 12

<211> 327

<212> PRT

<213> Haemophilus influenzae Rd KW20

<400> 12

Thr Phe Ile Leu Gln Gln Gln Glu Ile Ser Phe Val Lys Asn Thr Phe
 1 5 10 15

Thr Gln Asn Leu Ile Glu Gln Leu Gly Ile Ile Glu Val Gln Gly Pro
 20 25 30

Ile Leu Ser Gln Val Gly Asn Gly Met Gln Asp Asn Leu Ser Gly Ile
 35 40 45

Glu Lys Ala Val Gln Val Asn Val Lys Cys Ile Pro Asn Ala Val Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
 65 70 75 80

Phe Asn Phe Lys Glu Asp Glu Gly Leu Phe Val His Met Lys Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Ser Leu Asp Pro Thr His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Lys Val Ile Pro Glu Gly Arg Arg Asn Phe Ala
 115 120 125

Tyr Leu Lys Glu Thr Val Asn Ser Ile Tyr Arg Ala Ile Arg Leu Thr
 130 135 140

Glu Leu Ala Val Glu Ala Arg Phe Asp Ile Pro Ser Ile Leu Pro Lys
 145 150 155 160

Gln Ile Thr Phe Val His Ser Glu Asp Leu Val Lys Arg Tyr Pro Asp
 165 170 175

Leu Ser Ser Lys Glu Arg Glu Asn Ala Ile Cys Lys Glu Tyr Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Lys Leu Ser Asp Gly Lys Pro His
 195 200 205

Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr Thr Glu Ser Glu Asn
 210 215 220

Gly Tyr Lys Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Asp Gln Leu
 225 230 235 240

Gly Lys Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Ser
 245 250 255

Ala Leu Arg Leu Gln Val Gly Leu Thr Gly Asp Glu Asp His Leu Lys
 260 265 270

Met Asp Trp His Gln Asp Leu Leu Asn Gly Lys Leu Pro Leu Thr Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Ala Met Leu Leu Leu Arg Lys
 290 295 300

Lys His Ile Gly Glu Val Gln Ser Ser Val Trp Pro Lys Glu Met Leu
 305 310 315 320

Glu Glu Phe Ser Asn Ile Leu
 325

<210> 13

<211> 327

<212> PRT

<213> Pasteurella multocida subsp. multocida str. Pm70

<400> 13

Ser Phe Ile Leu Gln Gln Gln Glu Ile Ser Phe Ala Lys Asn Thr Phe
 1 5 10 15

Thr Glu Lys Leu Ala Glu His Leu Gly Ile Val Glu Val Gln Gly Pro
 20 25 30

Ile Leu Ser Gln Val Gly Asn Gly Ile Gln Asp Asn Leu Ser Gly Ala
 35 40 45

Glu Lys Ala Val Gln Val Asn Val Lys Gln Ile Thr Asp Ala Thr Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
 65 70 75 80

Phe Asn Phe Ala Gln Gly Glu Gly Leu Phe Val His Met Thr Ala Leu

85

90

95

Arg Pro Asp Glu Asp Ser Leu Asp Gln Thr His Ser Val Tyr Val Asp
 100 105 110

Gln Trp Asp Trp Glu Lys Val Ile Ser Ala Glu Gln Arg Asn Leu Ala
 115 120 125

Tyr Leu Lys Glu Thr Val Arg Ala Ile Tyr Ala Ala Ile Leu Glu Thr
 130 135 140

Glu Glu Ala Val Ser Lys Lys Phe Gly Leu Ala Thr Phe Leu Pro Lys
 145 150 155 160

Asp Ile Gln Phe Val His Ser Glu Glu Leu Val Gln Arg Phe Pro Asn
 165 170 175

Met Asn Asp Lys Glu Arg Glu Asn Ala Ile Cys Lys Glu Tyr Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Lys Leu Ser Asp Gly Lys Pro His
 195 200 205

Asp Val Arg Ala Pro Asp Tyr Asp Asp Trp Thr Thr Pro Ser Glu Gly
 210 215 220

Glu Tyr Lys Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Pro Ile Leu
 225 230 235 240

Glu Arg Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Thr
 245 250 255

Ala Leu Arg Lys Gln Leu Ala Leu Thr Asn Asn Glu Asp Arg Leu Lys
 260 265 270

Phe Asp Trp His Gln Asp Leu Val Asn Gly Arg Leu Pro Leu Ser Ile
 275 280 285

Gly Gly Gly Ile Gly Arg Ser Arg Leu Val Met Leu Leu Leu Gln Lys
 290 295 300

Lys His Ile Gly Glu Val Gln Ser Ser Val Trp Pro Lys Trp Val Met
 305 310 315 320

Glu Gln Phe Asp Asn Ile Leu
325

<210> 14
<211> 327
<212> PRT
<213> Haemophilus somnus 129PT

<400> 14

Ser Phe Ile Leu Gln Gln Gln Glu Ile Ser Phe Ala Lys Asn Thr Phe
1 5 10 15

Thr Glu Lys Leu Ile Glu His Leu Gly Ile Ile Glu Val Gln Gly Pro
20 25 30

Ile Leu Ser Gln Val Gly Asn Gly Ile Gln Asp Asn Leu Ser Gly Thr
35 40 45

Glu Lys Ala Val Gln Val Asn Val Lys Gln Ile Thr Asp Ala Lys Phe
50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
65 70 75 80

Phe Asn Phe Ala Glu Asn Glu Gly Leu Phe Val His Met Lys Ala Leu
85 90 95

Arg Pro Asp Glu Asp Ser Leu Asp Gln Thr His Ser Val Tyr Val Asp
100 105 110

Gln Trp Asp Trp Glu Lys Val Ile Pro Thr Gly Arg Arg Asn Leu Ala
115 120 125

Tyr Leu Lys Glu Thr Val Arg Ser Ile Tyr Gln Ala Ile Leu Glu Thr
130 135 140

Glu Asp Ala Val His Gln Lys Phe Gly Leu Ser Lys Phe Leu Pro Arg
145 150 155 160

Glu Ile Thr Phe Ile His Ser Glu Glu Leu Val Gln Arg Tyr Pro Glu
165 170 175

Leu Asn Asp Lys Gln Arg Glu Asn Ala Ile Cys Lys Glu Tyr Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Val Leu Ser Asp Gly Lys Pro His
 195 200 205

Asp Lys Arg Ala Pro Asp Tyr Asp Asp Trp Thr Thr Pro Ser Glu Gly
 210 215 220

Glu Tyr Leu Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Pro Val Leu
 225 230 235 240

Glu Arg Ala Phe Glu Val Ser Ser Met Gly Ile Arg Val Asp Glu Thr
 245 250 255

Ala Leu Arg Lys Gln Leu Ala Leu Thr Gly Asp Glu Asp Arg Leu Gln
 260 265 270

Phe Asp Trp His Gln Asp Leu Val Asn Gly Arg Leu Pro Leu Ser Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Ala Met Leu Leu Leu Gln Lys
 290 295 300

Lys His Ile Gly Glu Val Gln Ser Ser Val Trp Pro Lys Val Val Thr
 305 310 315 320

Glu Gln Phe Glu Asn Ile Leu
 325

<210> 15

<211> 327

<212> PRT

<213> Treponema pallidum subsp. pallidum str. Nichols

<400> 15

Ser Phe Ile Leu Gln Gln Gln Gly Ile Ser Phe Ala Lys His Thr Phe
 1 5 10 15

Thr Gln Lys Leu Met Glu His Leu Gly Leu Ile Glu Val Gln Gly Pro
 20 25 30

Leu Leu Ser Gln Val Gly Asp Gly Ile Gln Asp Gly Leu Ser Gly Arg
 35 40 45

Glu Lys Ala Val Ser Val Ser Val Lys Gln Ile Pro Gly Thr Ala Phe
 50 55 60

Glu Val Val His Ser Leu Ala Lys Trp Lys Arg His Thr Leu Ala Arg
 65 70 75 80

Tyr Gly Phe Gln Asp Asn Glu Gly Leu Phe Val His Met Ile Ala Leu
 85 90 95

Arg Pro Asp Glu Asp Phe Leu Asp Gln Val Arg Ser Val Cys Val Asp
 100 105 110

Gln Trp Asp Trp Glu Lys Val Val Pro Val Gly Ser Arg Asn Leu Ala
 115 120 125

Tyr Leu Lys Asp Thr Val Arg Lys Val Tyr Gly Ala Leu Arg Glu Ser
 130 135 140

Glu Val Leu Val Ser Glu Arg Phe Gly Leu Arg Ala Phe Leu Pro Ala
 145 150 155 160

Asp Ile Val Phe Val Gln Ser Glu Glu Leu Val Arg Arg Tyr Pro His
 165 170 175

Leu Asp Ser Lys Gly Arg Glu Asp Ala Ile Cys Lys Glu His Gly Ala
 180 185 190

Val Phe Leu Ile Gly Ile Gly Gly Val Leu Ser Asp Gly Lys Pro His
 195 200 205

Asp Val Arg Ala Pro Asp Tyr Asp Asp Trp Thr Thr Pro Ser Glu Gly
 210 215 220

Glu Tyr Lys Gly Leu Asn Gly Asp Ile Leu Val Trp Asn Pro Val Leu
 225 230 235 240

Gly Arg Ala Phe Glu Val Ser Ser Met Gly Ile Arg Val Asp Glu Gly
 245 250 255

Ala Leu Arg Thr Gln Leu Ala Leu Thr Gly Asp Glu Asp Ser Leu Ala
 260 265 270

Cys Ser Trp His Gln Asp Leu Ile Asn Gly Arg Leu Pro Gln Ser Ile
 275 280 285

Gly Gly Gly Ile Gly Gln Ser Arg Leu Ala Met Leu Leu Leu Gln Arg
 290 295 300

Lys His Ile Gly Glu Val Gln Ala Ser Val Trp Pro Arg Ser Val Arg
 305 310 315 320

Glu Glu Phe Glu Asn Ile Leu
 325

<210> 16
 <211> 308
 <212> PRT
 <213> Bacillus cereus ATCC 14579

<400> 16

Gln Ile Ala Ile Lys Glu Val Lys Thr Phe Phe Glu Asp Gln Leu Ala
 1 5 10 15

Lys Arg Leu Glu Leu Phe Arg Val Ser Ala Pro Leu Phe Val Thr Lys
 20 25 30

Lys Ser Gly Leu Asn Asp His Leu Asn Gly Val Glu Arg Pro Ile Glu
 35 40 45

Phe Asp Met Leu His Ser Gly Glu Glu Leu Glu Ile Val His Ser Leu
 50 55 60

Ala Lys Trp Lys Arg Phe Ala Leu His Glu Tyr Gly Tyr Glu Ala Gly
 65 70 75 80

Glu Gly Leu Tyr Thr Asn Met Asn Ala Ile Arg Arg Asp Glu Glu Leu
 85 90 95

Asp Ala Thr His Ser Ile Tyr Val Asp Gln Trp Asp Trp Glu Lys Ile
 100 105 110

Val Gln Lys Glu Trp Arg Thr Val Glu Tyr Leu Gln Lys Thr Val Gln
 115 120 125

Thr Ile Tyr Gly Ile Phe Lys Asp Leu Glu Asp His Leu Phe Glu Lys

130

135

140

Tyr Pro Phe Leu Gly Lys Tyr Leu Pro Glu Glu Ile Val Phe Val Thr
 145 150 155 160

Ser Gln Glu Leu Glu Asp Lys Tyr Pro Glu Leu Thr Pro Lys Asp Arg
 165 170 175

Glu His Ala Ile Ala Lys Glu His Gly Ala Val Phe Ile Ile Gly Ile
 180 185 190

Gly Asp Ala Leu Arg Ser Gly Glu Lys His Asp Gly Arg Ala Ala Asp
 195 200 205

Tyr Asp Asp Trp Lys Leu Asn Gly Asp Ile Leu Phe Trp His Pro Val
 210 215 220

Leu Gln Ser Ser Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Ser
 225 230 235 240

Lys Ser Leu Asp Glu Gln Leu Thr Lys Thr Gly Glu Asp Phe Lys Arg
 245 250 255

Glu Tyr Asp Phe His Lys Gly Ile Leu Glu Asp Val Leu Pro Leu Thr
 260 265 270

Ile Gly Gly Gly Ile Gly Gln Ser Arg Met Cys Met Tyr Phe Leu Arg
 275 280 285

Lys Ala His Ile Gly Glu Val Gln Ser Ser Val Trp Pro Asp Asp Leu
 290 295 300

Arg Glu Ala Cys
 305

<210> 17
 <211> 308
 <212> PRT
 <213> Bacillus anthracis str. A2012

<400> 17

Gln Ile Ala Ile Lys Glu Val Lys Thr Phe Phe Glu Asp Gln Leu Ala
 1 5 10 15

Lys Arg Leu Glu Leu Phe Arg Val Ser Ala Pro Leu Phe Val Thr Lys
 20 25 30

Lys Ser Gly Leu Asn Asp His Leu Asn Gly Val Glu Arg Pro Ile Glu
 35 40 45

Phe Asp Met Leu His Ser Gly Glu Glu Leu Glu Ile Val His Ser Leu
 50 55 60

Ala Lys Trp Lys Arg Phe Ala Leu His Glu Tyr Gly Tyr Glu Ala Gly
 65 70 75 80

Glu Gly Leu Tyr Thr Asn Met Asn Ala Ile Arg Arg Asp Glu Glu Leu
 85 90 95

Asp Ala Thr His Ser Ile Tyr Val Asp Gln Trp Asp Trp Glu Lys Ile
 100 105 110

Val Gln Lys Glu Trp Arg Thr Val Asp Tyr Leu Gln Lys Thr Val Leu
 115 120 125

Thr Ile Tyr Gly Ile Phe Lys Asp Leu Glu Asp His Leu Phe Glu Lys
 130 135 140

Tyr Pro Phe Leu Gly Lys Tyr Leu Pro Glu Glu Ile Val Phe Val Thr
 145 150 155 160

Ser Gln Glu Leu Glu Asp Lys Tyr Pro Glu Leu Thr Pro Lys Asp Arg
 165 170 175

Glu His Ala Ile Ala Lys Glu His Gly Ala Val Phe Ile Ile Gly Ile
 180 185 190

Gly Asp Ala Leu Arg Ser Gly Glu Lys His Asp Gly Arg Ala Ala Asp
 195 200 205

Tyr Asp Asp Trp Lys Leu Asn Gly Asp Ile Leu Phe Trp His Pro Val
 210 215 220

Leu Gln Ser Ser Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Ser
 225 230 235 240

Lys Ser Leu Asp Glu Gln Leu Thr Lys Thr Gly Glu Asp Phe Lys Arg
 245 250 255

Glu Tyr Asp Phe His Lys Gly Ile Leu Glu Asp Val Leu Pro Leu Thr
 260 265 270

Ile Gly Gly Gly Ile Gly Gln Ser Arg Met Cys Met Tyr Phe Leu Arg
 275 280 285

Lys Ala His Ile Gly Glu Val Gln Ser Ser Val Trp Pro Asp Asp Leu
 290 295 300

Arg Glu Ala Cys
 305

<210> 18
 <211> 309
 <212> PRT
 <213> Clostridium tetani E88

<400> 18

Ala Ile Lys Glu Val Lys Asp Cys Phe Glu Arg Ala Leu Ala Lys Gln
 1 5 10 15

Leu Asn Leu Ile Arg Val Ser Ala Pro Leu Phe Val Arg Cys Asp Lys
 20 25 30

Gly Leu Asn Asp Asn Leu Asn Gly Val Glu Arg Pro Val Lys Phe Thr
 35 40 45

Val Lys Asp Asp Asn Glu Ala Ala Val Glu Ile Val His Ser Leu Ala
 50 55 60

Lys Trp Lys Arg Met Ala Leu Tyr Arg Tyr Asn Phe Asn Ala Asp Glu
 65 70 75 80

Gly Leu Tyr Thr Asp Met Asn Ala Ile Arg Arg Asp Glu Glu Leu Asp
 85 90 95

Asn Thr His Ser Ile Tyr Val Asp Gln Trp Asp Trp Glu Arg Ile Ile
 100 105 110

Lys Lys Glu Asp Arg Asn Glu Glu Tyr Leu Lys Asp Ile Val Arg Lys
 115 120 125

Ile Phe Lys Ala Phe Lys Glu Thr Glu Glu His Ile Asn Lys Leu Tyr
 130 135 140

Pro Phe Leu Gly Glu Val Leu Pro Glu Glu Val Phe Phe Met Thr Thr
 145 150 155 160

Gln Glu Leu Glu Asp Met Phe Pro Asp Leu Thr Ala Lys Glu Arg Glu
 165 170 175

Asp Ala Ile Thr Lys Glu Lys Lys Ala Val Phe Leu Met Lys Ile Gly
 180 185 190

Lys Thr Leu Glu Ser Gly Glu Lys His Asp Gly Arg Ala Pro Asp Tyr
 195 200 205

Asp Asp Trp Glu Leu Asn Gly Asp Ile Leu Phe Trp Asn Pro Val Leu
 210 215 220

Asn Lys Ala Phe Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Glu
 225 230 235 240

Ser Leu Leu Lys Gln Leu Lys Leu Ala Asn Cys Glu Glu Arg Lys Glu
 245 250 255

Leu Gln Phe His Lys Met Leu Leu Glu Lys Lys Leu Pro Tyr Thr Ile
 260 265 270

Gly Gly Gly Ile Gly Gln Ser Arg Met Cys Met Leu Phe Leu Lys Lys
 275 280 285

Ala His Ile Gly Glu Val Gln Ser Ser Ile Trp Pro Glu Glu Met Ile
 290 295 300

Lys Phe Cys Glu Glu
 305

<210> 19
 <211> 161
 <212> PRT
 <213> Clostridium thermocellum ATCC 27405
 <400> 19

Asp Met Asn Ala Ile Arg Arg Asp Glu Asp Leu Asp Asn Leu His Ser
1 5 10 15

Ile Tyr Val Asp Gln Trp Asp Trp Glu Leu Val Ile Asn Lys Glu Asp
20 25 30

Arg Asn Glu Glu Thr Leu Lys Asn Ile Val Lys Lys Ile Tyr Asn Val
35 40 45

Leu Lys Lys Thr Glu Asp Phe Ile Ala Glu Gln Tyr Pro Gln Ile Pro
50 55 60

Lys Phe Leu Pro Glu Asp Ile Phe Phe Ile Thr Thr Gln Glu Leu Glu
65 70 75 80

Asp Met Tyr Pro Glu Leu Ser Pro Lys Glu Arg Glu Asp Ala Ile Ala
85 90 95

Lys Glu Lys Lys Ala Ile Phe Leu Met Lys Ile Gly Gly Val Leu Lys
100 105 110

Ser Gly Lys Lys His Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr
115 120 125

Leu Asn Gly Asp Ile Ile Leu Trp Tyr Pro Leu Leu Glu Arg Ser Phe
130 135 140

Glu Ile Ser Ser Met Gly Ile Arg Val Asp Glu Asn Ser Leu Leu Ser
145 150 155 160

Gln

<210> 20

<211> 307

<212> PRT

<213> *Fusobacterium nucleatum* subsp. *vincentii* ATCC 49256

<400> 20

Glu Ile Ala Ile Lys Lys Val Lys Asp Phe Phe Glu Ser Arg Leu Ala
1 5 10 15

Lys Glu Leu Asp Leu Leu Arg Val Ser Ala Pro Leu Phe Val Ile Pro
20 25 30

Glu Ser Gly Leu Asn Asp Asn Leu Asn Gly Thr Glu Arg Pro Val Ser
 35 40 45

Phe Asp Thr Lys Ser Gly Glu Arg Val Glu Ile Val His Ser Leu Ala
 50 55 60

Lys Trp Lys Arg Met Ala Leu Tyr Arg Tyr Asn Ile Glu Asn His Lys
 65 70 75 80

Gly Ile Tyr Thr Asp Met Asn Ala Ile Arg Arg Asp Glu Asp Thr Asp
 85 90 95

Phe Ile His Ser Tyr Tyr Val Asp Gln Trp Asp Trp Glu Lys Ile Ile
 100 105 110

Ser Lys Glu Asp Arg Asn Glu Glu Tyr Leu Lys Glu Thr Val Arg Lys
 115 120 125

Ile Tyr Cys Val Phe Lys Glu Thr Glu Glu Tyr Ile Thr Thr Glu Tyr
 130 135 140

Pro Lys Leu Thr Lys Lys Leu Pro Glu Glu Ile Thr Phe Ile Thr Ser
 145 150 155 160

Gln Glu Leu Glu Asn Lys Tyr Pro Asn Leu Thr Pro Lys Asn Arg Glu
 165 170 175

His Ala Ala Ala Lys Glu Tyr Gly Ala Ile Phe Leu Met Lys Ile Gly
 180 185 190

Gly Lys Leu Ser Ser Gly Glu Lys His Asp Gly Arg Ala Pro Asp Tyr
 195 200 205

Asp Asp Trp Asp Leu Asn Gly Asp Ile Ile Phe Asn Tyr Pro Leu Leu
 210 215 220

Gly Ile Gly Leu Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Lys
 225 230 235 240

Ser Leu Asp Glu Gln Leu Lys Ile Ala Asn Cys Glu Asp Arg Arg Ser
 245 250 255

Leu Pro Tyr His Gln Met Ile Leu Asn Lys Val Leu Pro Tyr Thr Ile
 260 265 270

Gly Gly Gly Ile Gly Gln Ser Arg Ile Cys Met Phe Phe Leu Asp Lys
 275 280 285

Leu His Ile Gly Glu Val Gln Ala Ser Ile Trp Ser Gln Glu Val His
 290 295 300

Glu Ile Cys
 305

<210> 21
 <211> 307
 <212> PRT
 <213> *Fusobacterium nucleatum* subsp. *nucleatum* ATCC 25586

<400> 21

Glu Ile Ala Ile Lys Lys Val Lys Asp Phe Phe Glu Ser His Leu Ser
 1 5 10 15

Lys Glu Leu Asp Leu Leu Arg Val Ser Ala Pro Leu Phe Val Ile Pro
 20 25 30

Glu Ser Gly Leu Asn Asp Asn Leu Asn Gly Thr Glu Arg Pro Val Ser
 35 40 45

Phe Asp Thr Lys Ser Gly Glu Arg Val Glu Ile Val His Ser Leu Ala
 50 55 60

Lys Trp Lys Arg Met Ala Leu Tyr Arg Tyr Asn Ile Glu Asn Asp Lys
 65 70 75 80

Gly Ile Tyr Thr Asp Met Asn Ala Ile Arg Arg Asp Glu Asp Thr Asp
 85 90 95

Phe Ile His Ser Tyr Tyr Val Asp Gln Trp Asp Trp Glu Lys Ile Ile
 100 105 110

Ser Lys Glu Asp Arg Asn Glu Glu Tyr Leu Lys Asp Val Val Arg Lys
 115 120 125

Ile Tyr Ser Val Phe Lys Lys Thr Glu Glu Tyr Ile Thr Thr Glu Tyr

130

135

140

Pro Lys Leu Thr Lys Lys Leu Pro Glu Glu Ile Thr Phe Ile Thr Ala
 145 150 155 160

Gln Glu Leu Glu Asn Lys Tyr Pro Asn Leu Thr Pro Lys Asn Arg Glu
 165 170 175

His Ala Ala Ala Lys Glu Tyr Gly Ala Ile Phe Leu Met Lys Ile Gly
 180 185 190

Gly Lys Leu Ser Ser Gly Glu Lys His Asp Gly Arg Ala Pro Asp Tyr
 195 200 205

Asp Asp Trp Asp Leu Asn Gly Asp Ile Ile Phe Asn Tyr Pro Leu Leu
 210 215 220

Gly Ile Gly Leu Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Lys
 225 230 235 240

Ser Leu Asp Glu Gln Leu Lys Ile Ala Asn Cys Glu Asp Arg Arg Ser
 245 250 255

Leu Pro Tyr His Gln Met Ile Leu Asn Lys Val Leu Pro Tyr Thr Ile
 260 265 270

Gly Gly Gly Ile Gly Gln Ser Arg Ile Cys Met Phe Phe Leu Asp Lys
 275 280 285

Leu His Ile Gly Glu Val Gln Ala Ser Ile Trp Ser Gln Glu Val His
 290 295 300

Glu Ile Cys
 305

<210> 22
 <211> 309
 <212> PRT
 <213> Clostridium perfringens str. 13

<400> 22

Ala Ile Lys Glu Leu Lys Asp Phe Phe Glu Asp Ser Leu Ala Lys Asn
 1 5 10 15

Leu Asn Leu Thr Arg Val Ser Ala Pro Leu Phe Val Asn Lys Gly Ser
 20 25 30

Gly Leu Asn Asp Asp Leu Asn Gly Ile Glu Arg Pro Val Ser Phe Asp
 35 40 45

Met Lys Ala Met Pro Glu Phe Asn Ile Gln Ile Val His Ser Leu Ala
 50 55 60

Lys Trp Lys Arg Leu Ala Leu His Arg Tyr Glu Phe Glu His Gly Glu
 65 70 75 80

Gly Leu Tyr Thr Asp Met Asn Ala Ile Arg Arg Asp Glu Asp Leu Asp
 85 90 95

Asn Ile His Ser Ile Tyr Val Asp Gln Trp Asp Trp Glu Lys Ile Ile
 100 105 110

Asp Lys Glu Glu Arg Asn Leu Glu Thr Leu Lys Glu Thr Val Lys Ser
 115 120 125

Ile Tyr Gly Thr Phe Lys Ala Thr Glu Asp Phe Ile Val Ala Lys Tyr
 130 135 140

Pro His Ile Glu Lys Ile Leu Pro Glu Asp Ile Thr Phe Ile Thr Ser
 145 150 155 160

Gln Glu Leu Glu Asp Arg Tyr Pro Asp Leu Thr Ser Lys Glu Arg Glu
 165 170 175

Thr Ala Ile Cys Lys Glu Phe Gly Ala Val Phe Ile Ile Gly Ile Gly
 180 185 190

Gly Lys Leu Ala Ser Gly Glu Lys His Asp Asp Arg Ser Pro Asp Tyr
 195 200 205

Asp Asp Trp Thr Leu Asn Gly Asp Leu Leu Phe Tyr Tyr Pro Leu Phe
 210 215 220

Asp Glu Ala Val Glu Leu Ser Ser Met Gly Ile Arg Val Asp Glu Glu
 225 230 235 240

Ser Leu Leu Lys Gln Leu Lys Ile Ala Glu Cys Glu Glu Arg Lys Glu
 245 250 255

Leu Pro Phe His Gln Met Leu Leu Glu Gly Lys Leu Pro Tyr Thr Ile
 260 265 270

Gly Gly Gly Ile Gly Gln Ser Arg Ile Cys Met Phe Phe Leu Arg Lys
 275 280 285

Ala His Ile Gly Glu Val Gln Ala Ser Met Trp Asp Glu Asp Met Ile
 290 295 300

Arg Thr Cys Glu Glu
 305

<210> 23
 <211> 309
 <212> PRT
 <213> Lactobacillus gasseri

<400> 23

Ala Ile Val Phe Ile Arg Glu Thr Phe Gln Asp Lys Ile Ala Glu Lys
 1 5 10 15

Leu Asn Val Gln Arg Met Ser Ala Pro Met Phe Val Glu Lys Ser Thr
 20 25 30

Gly Leu Asn Asp Asn Leu Asn Gly Val Glu Arg Pro Val Ser Phe Asp
 35 40 45

Met Lys Ala Met Pro Asn Asp Thr Ile Glu Val Val His Ser Leu Ala
 50 55 60

Lys Trp Lys Arg Leu Ala Leu Lys Arg Tyr Gly Phe Gly Met His Glu
 65 70 75 80

Gly Leu Tyr Thr Asn Met Asn Ala Ile Arg Arg Asp Glu Asp Leu Asp
 85 90 95

Asn Phe His Ser Ile Tyr Val Asp Gln Trp Asp Trp Glu Lys Ile Ile
 100 105 110

Ser Lys Asp Glu Arg Asn Ile Asp Thr Leu Lys Asp Thr Val Lys Gln
 115 120 125

Ile Phe Lys Ala Ile Lys Glu Thr Glu Lys Glu Val Ala Ala Arg Tyr
 130 135 140

Pro Ser Ser Thr Tyr Arg Leu Pro Asn Glu Ile Thr Phe Ile Thr Thr
 145 150 155 160

Gln Glu Leu Glu Asp Arg Trp Pro Asp Leu Thr Pro Asp Glu Arg Glu
 165 170 175

Asp Lys Ile Ala Lys Glu Lys Lys Ala Val Phe Leu Met Lys Ile Gly
 180 185 190

Asp Lys Leu Lys Arg Ser Gly Lys Pro His Asp Gly Arg Ala Pro Asp
 195 200 205

Tyr Asp Asp Trp Gln Leu Asn Gly Asp Leu Leu Phe Trp Tyr Glu Pro
 210 215 220

Leu Gln Arg Lys Leu Glu Ile Ser Ser Met Gly Ile Arg Val Ser Glu
 225 230 235 240

Glu Ser Leu Lys Thr Gln Leu Lys Lys Ala His Ala Glu Glu Arg Ala
 245 250 255

Ala Leu Pro Phe His Lys Met Leu Leu Asn Gly Glu Leu Pro Tyr Thr
 260 265 270

Ile Gly Gly Gly Ile Gly Gln Ser Arg Leu Cys Met Leu Leu Leu Gly
 275 280 285

Lys Ala His Ile Gly Glu Val Gln Ala Ser Ile Trp Pro Pro Lys Met
 290 295 300

Ile Glu Glu Cys Glu
 305

<210> 24

<211> 301

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 24

Gln Gln Ala Ile Arg Tyr Ile Arg Glu Thr Phe Gln Asp Glu Phe Gly
 1 5 10 15

Lys Gln Leu Asn Leu Ser Arg Leu Ser Ala Pro Met Phe Val Glu Lys
 20 25 30

Lys Thr Gly Leu Asn Asp Asn Leu Asn Gly Val Glu Lys Pro Val Ser
 35 40 45

Phe Thr Met Gln Asp Met Gly Asp Glu Gln Ile Glu Ile Val His Ser
 50 55 60

Leu Ala Lys Trp Lys Arg Val Ala Leu Lys Arg Tyr Gly Phe Asp Met
 65 70 75 80

His Glu Gly Leu Tyr Thr Asn Met Asn Ala Ile Arg Lys Asp Glu Asp
 85 90 95

Leu Asp Asn Tyr His Ser Ala Tyr Val Asp Gln Trp Asp Trp Glu Lys
 100 105 110

Val Ile Ser Lys Glu Glu Arg Thr Val Glu Thr Leu Lys Ala Ala Val
 115 120 125

Arg Gln Ile Phe Lys Val Ile Lys His Met Glu His Glu Val Trp Tyr
 130 135 140

Lys Phe Pro Gln Ala Val His His Leu Pro Asp Glu Ile His Phe Leu
 145 150 155 160

Thr Thr Gln Glu Leu Glu Asp Met Tyr Pro Asp Met Thr Pro Arg Glu
 165 170 175

Arg Glu Asn Ala Ile Cys Lys Lys Leu Gly Cys Val Phe Leu Met Gln
 180 185 190

Ile Gly Trp Lys Leu Asp Ser Gly Glu Arg His Asp Gly Arg Ala Pro
 195 200 205

Asp Tyr Asp Asp Trp Lys Leu Asn Gly Asp Ile Leu Phe Trp Tyr Glu
 210 215 220

Pro Leu Asp Gln Ala Ile Glu Ile Ser Ser Met Gly Ile Arg Val Asp

225 230 235 240
 Ala Glu Ser Met Lys Lys Gln Leu Lys Asp Val Asp Ala Glu Asp Arg
 245 250 255
 Leu Ser Leu Pro Tyr His Gln Met Ile Leu Asn Ala Asp Val Pro Tyr
 260 265 270
 Thr Ile Gly Gly Gly Ile Gly Gln Ser Arg Leu Cys Met Leu Leu Leu
 275 280 285
 Gly Lys Ala His Val Gly Glu Val Gln Ala Ala Leu Trp
 290 295 300

 <210> 25
 <211> 314
 <212> PRT
 <213> Lactobacillus delbrueckii subsp. bulgaricus

 <400> 25
 Ile Ala Lys Arg Lys Arg Gln Ser Ala Thr Ser Gly Lys Pro Ser Ser
 1 5 10 15
 Glu Phe Gly Thr Ala Met Asn Leu Glu Arg Ile Ser Ala Pro Met Phe
 20 25 30
 Val Lys Lys Ser Ser Gly Leu Asn Asp Asn Leu Ser Gly Trp Glu Lys
 35 40 45
 Pro Val Ser Phe Thr Leu His Asp Gly Asn Glu Gly Glu Leu Gln Ile
 50 55 60
 Val His Ser Leu Ala Lys Trp Lys Arg Trp Ala Leu Lys His Tyr Gly
 65 70 75 80
 Phe Ser His Gly Glu Gly Leu Phe Thr Asn Met Asn Ala Ile Arg Lys
 85 90 95
 Asp Glu Glu Val Leu Asp Asn Leu His Ser Val Tyr Val Asp Gln Trp
 100 105 110
 Asp Trp Glu Lys Val Ile Asp Lys Ser Glu Arg Thr Glu Ala Thr Leu
 115 120 125

Arg Gln Thr Val Gln Arg Ile Phe Glu Thr Ile Lys Gly Met Glu Tyr
 130 135 140

His Val Arg Ala Leu Tyr Pro Gln Ala Ala Tyr His Leu Pro Glu Glu
 145 150 155 160

Ile Ser Phe Val Thr Ser Glu Glu Leu Glu Ala Arg Trp Pro Ser Leu
 165 170 175

Thr Pro Ser Glu Arg Glu Asp Lys Ile Cys Gln Glu Lys Gly Ala Val
 180 185 190

Phe Leu Glu His Ile Gly Gly Ala Leu Pro Leu Ser Lys Lys Pro His
 195 200 205

Asp Leu Arg Ala Pro Asp Tyr Asp Asp Trp Thr Leu Asn Gly Asp Leu
 210 215 220

Leu Phe Trp Tyr Glu Pro Leu Gln Arg Ala Phe Glu Val Ser Ser Met
 225 230 235 240

Ser Ile Arg Val Asp Glu Asp Arg Leu Gln Glu Gln Leu Lys Leu Ala
 245 250 255

Gly Ala Glu Asp Arg Leu Asp Leu Pro Phe His Gln Ala Leu Leu Lys
 260 265 270

Gly Asp Leu Pro Tyr Ser Ile Gly Gly Gly Ile Gly Gln Ser Arg Leu
 275 280 285

Cys Met Leu Leu Leu Gln Gly Pro His Gly Glu Val Gln Ala Ser Ile
 290 295 300

Trp Pro Asp Glu Ile Val Glu Lys Cys Gln
 305 310

<210> 26
 <211> 325
 <212> PRT
 <213> Bacteroides thetaiotaomicron VPI-5482

<400> 26

Leu Lys Gln Thr Glu Leu Gly Ile Lys Gln Ile Lys Glu Phe Phe Gln

1	5	10	15
Leu Asn Leu Ser Ser Glu Leu Arg Leu Arg Arg Val Thr Ala Pro Leu	20	25	30
Phe Val Leu Lys Gly Met Gly Ile Asn Asp Asp Leu Asn Gly Ile Glu	35	40	45
Arg Pro Val Ser Phe Pro Ile Lys Asp Leu Gly Asp Ala Gln Ala Glu	50	55	60
Val Val His Ser Leu Ala Lys Trp Lys Arg Leu Thr Leu Ala Asp Tyr	65	70	75
Asn Ile Glu Pro Gly Tyr Gly Ile Tyr Thr Asp Met Asn Ala Ile Arg	85	90	95
Ser Asp Glu Glu Leu Gly Asn Leu His Ser Leu Tyr Val Asp Gln Trp	100	105	110
Asp Trp Glu Arg Val Ile Thr Asn Glu Asp Arg Asn Val Glu Phe Leu	115	120	125
Lys Glu Ile Val Asn Arg Ile Tyr Ala Ala Met Ile Arg Thr Glu Tyr	130	135	140
Met Val Tyr Glu Met Tyr Pro Gln Ile Lys Pro Cys Leu Pro Gln Lys	145	150	155
Leu His Phe Ile His Ser Glu Glu Leu Arg Gln Leu Tyr Pro Asn Leu	165	170	175
Glu Pro Lys Cys Arg Glu His Ala Ile Cys Gln Lys Tyr Gly Ala Val	180	185	190
Phe Ile Ile Gly Ile Gly Cys Lys Leu Ser Asp Gly Lys Lys His Asp	195	200	205
Gly Arg Ala Pro Asp Tyr Asp Asp Tyr Thr Ser Thr Gly Leu Asn Asn	210	215	220
Leu Pro Gly Leu Asn Gly Asp Leu Leu Leu Trp Asp Asp Val Leu Gln	225	230	235
			240

Arg Ser Ile Glu Leu Ser Ser Met Gly Val Arg Val Asp Arg Glu Ala
 245 250 255

Leu Gln Arg Gln Leu Lys Glu Glu Asn Glu Glu Glu Arg Leu Lys Leu
 260 265 270

Tyr Phe His Lys Arg Leu Met Asp Asp Thr Leu Pro Leu Ser Ile Gly
 275 280 285

Gly Gly Ile Gly Gln Ser Arg Leu Cys Met Phe Tyr Leu Arg Lys Ala
 290 295 300

His Ile Gly Glu Ile Gln Ala Ser Ile Trp Pro Glu Asp Met Arg Lys
 305 310 315 320

Glu Cys Glu Glu Leu
 325

<210> 27
 <211> 315
 <212> PRT
 <213> Mycoplasma penetrans HF-2

<400> 27

Ser Ile Leu Glu Thr Gln Lys Ala Ile Lys Phe Ile Lys Asp Leu Phe
 1 5 10 15

Gln Val Asn Leu Ala His Ala Leu Lys Leu His Arg Val Thr Ala Pro
 20 25 30

Leu Val Leu Glu Arg Asn Lys Gly Ile Asn Asp Asp Leu Asn Gly Ser
 35 40 45

Glu Asn Pro Val Thr Phe Thr Ser Asp Gly Asn Gly Ile Ser Gly Glu
 50 55 60

Ile Pro Gln Ser Leu Ala Lys Trp Lys Arg Met Met Leu Gly Lys Tyr
 65 70 75 80

Glu Ile Pro Leu His Glu Gly Ile Tyr Ala Asp Met Asn Ala Ile Arg
 85 90 95

Lys Asp Glu Ser Leu Ser Ser Ile His Ser Ile Tyr Val Asp Gln Trp
 100 105 110

Asp Trp Glu Leu His Ile Lys Lys Thr Glu Arg Asn Leu Glu Thr Leu
 115 120 125

Lys Val Val Val Lys Lys Ile Tyr Glu Ile Ile Arg Leu Cys Gln Lys
 130 135 140

Glu Val Asn Lys Lys Tyr Glu Trp Phe Ala Glu Asn Leu Leu Pro Glu
 145 150 155 160

Glu Ile Thr Phe Ile Ser Ser Glu Asp Leu Leu Gln Arg Tyr Pro Asn
 165 170 175

Lys Thr Pro Lys Glu Arg Glu Arg Leu Ile Ala Ser Lys Tyr Lys Ala
 180 185 190

Val Phe Ile Ile Gly Ile Gly Asp Asn Leu Ser Asp Gly Lys Pro His
 195 200 205

Asp Leu Arg Ala Pro Asp Tyr Asp Asp Trp Lys Leu Asn Gly Asp Ile
 210 215 220

Ile Val Trp Asn Glu Thr Thr Lys Ser Ala Leu Glu Leu Ser Ser Met
 225 230 235 240

Gly Ile Arg Val Asp Glu Val Ser Leu Val Glu Gln Leu Asp Lys Ser
 245 250 255

Asn Asn Asn Ser Arg Lys Glu Leu Asp Phe His Lys Lys Leu Ile Asn
 260 265 270

Lys Glu Phe Pro Tyr Ser Ile Gly Gly Gly Ile Gly Gln Ser Arg Leu
 275 280 285

Cys Tyr Phe Leu Leu His Lys Gln His Ile Gly Glu Val Gln Ser Ser
 290 295 300

Leu Trp Pro Lys Asp Ile Leu Glu Glu Ala Glu
 305 310 315

<210> 28

<211> 72
 <212> PRT
 <213> Mycoplasma gallisepticum

<400> 28

Ile Arg Val Asn Lys Glu Val Leu Leu Lys Gln Leu Glu Glu Ser Lys
 1 5 10 15

Gln Asn Glu Arg Leu Glu Leu Met Phe His Lys Lys Leu Val Asn Gly
 20 25 30

Glu Leu His Gln Thr Ile Gly Gly Gly Ile Gly Gln Ser Arg Leu Cys
 35 40 45

Tyr Phe Leu Leu Gln Lys Asp His Ile Gly Glu Val Gln Ala Ser His
 50 55 60

Trp Ser Asp Glu Ile Val Ala Glu
 65 70

<210> 29
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 <213> Ureaplasma parvum serovar 3 str. ATCC 700970

<400> 29

Gln Lys Ala Ile Val Glu Ile Lys Asn Ser Phe Gln Lys His Phe Ala
 1 5 10 15

Lys Asn Leu Asn Leu Ser Arg Val Thr Ala Pro Leu Phe Val Glu Gly
 20 25 30

Gln Ser Gly Leu Asn Asp His Leu Asp His Lys Gln Lys Ala Val Ser
 35 40 45

Phe Tyr Ala Lys Lys Leu Asp Lys Thr Leu Glu Ile Val Gln Ser Leu
 50 55 60

Ala Lys Trp Lys Arg Leu Ala Leu Leu Asp Tyr Gly Phe Ser Leu Tyr
 65 70 75 80

Glu Gly Leu Tyr Thr Asp Met Asn Ala Ile Arg Ala Asp Asp Asp Ile
 85 90 95

Asp Glu Ile His Ser Ile Tyr Val Asp Gln Trp Asp Trp Glu Ile Leu
 100 105 110

Ile Asn Asn Gln Asp Cys Asn Leu Asp Phe Leu Lys Ser Ile Val Asn
 115 120 125

Lys Ile Tyr Ser Thr Ile Arg Ile Val Gln Leu Glu Ile Asp Gln Leu
 130 135 140

Tyr Asn Pro Lys Gln Ile Ile Leu Pro Asp Ser Ile Thr Phe Ile Ser
 145 150 155 160

Ser Gln Glu Leu Glu Asp Leu Tyr Pro His Leu Ser Pro Ser Arg Arg
 165 170 175

Glu Tyr Glu Phe Ala Lys Ile His Lys Ala Ile Phe Ile Tyr Gln Ile
 180 185 190

Gly Tyr Pro Leu Lys Ser Gly Tyr Ile Gln Ser Ile Arg Ser Pro Glu
 195 200 205

Tyr Asp Asn Trp Asn Leu Asn Gly Asp Leu Ile Val Tyr His Lys Leu
 210 215 220

Asn Asp Gln Ala Ile Glu Leu Ser Ser Met Gly Ile Arg Val Ser Lys
 225 230 235 240

Gln Asp Phe Ile Lys Gln Thr Asn Phe Ala Asn Leu Lys Asn Asp Gln
 245 250 255

Glu Asn Asn Phe Tyr His Gln Met Ile Leu Asn Asn Gln Leu Pro Gln
 260 265 270

Thr Ile Gly Gly Gly Ile Gly Gln Ser Arg Leu Cys Met Phe Leu Leu
 275 280 285

Asn Lys Lys His Ile Gly Glu Val Gln Val Ser Val Trp Pro Asn Glu
 290 295 300

Tyr Lys Asp Glu Leu
 305